The impact of service and goods offshoring on employment: firm level evidence

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Abstract

The impact of technological progress and globalisation on domestic labour markets is subject to a large debate. Recently, the offshoring of services and its effects have attracted the attention of academics as well as policy makers as the constant improvements in technology and global communications lead to increased tradability of services. This paper contributes to the literature by investigating the relationship betwee, employment outcomes and the offshoring of both (intermediate) goods production as well as services. To this end we combine transaction level data on international trade in goods and services with Belgian firm level data from the annual accounts.

JEL codes:

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1 Introduction

The impact of technological progress and globalisation on domestic labour markets is the subject of a large debate among academics, policy makers as well as the general public (**?**). The academic debate centers on the importance of international trade and offshoring as opposed to skill-biased technological change in explaining the decline in the relative demand for unskilled workers (e.g. **?**). Depending on the research methodology and the measurement of international trade exposure and technological progress, globalization has been shown to explain a substantial part of wage inequality in the US (**?**).

Recently, the offshoring of services has attracted attention. The constant improvements in technology and global communications lead to increased tradability of services. Consequently a large number of jobs previously insulated from foreign competition can now be located abroad (**?**). Moreover employees active in the services sector are typically relatively higher skilled, which could reduce the relative demand for skilled labour and could hence increase wage inequality. The few studies on the subject have however found very modest effects of service offshoring on firm-level employment (**?**, **?**).

A different strand of literature has investigated the impact of globalization decisions of firms on firm performance. For example, **?** show how the imports of intermediate products lead to higher productivity. **?** provide evidence that the access to new intermediate goods varieties is an important source of productivity growth. **?** find that access to foreign imports increases firm product scope. These indirect effects can lead offshoring firms to increase market shares and possibly mitigate or even turn around the initial effects of offshoring.

We aim to contribute to the literature by investigating the relationship between employment outcomes and the offshoring of both (intermediate) goods production as well as services. To this end we combine transaction level data on international trade in goods and services with Belgian firm level data from the annual accounts. As a result we obtain a data set with firm level data on imports and exports of goods and services at the firm level.

In the annual reports we moreover observe the skill structure of the labor force as measured by the schooling level which makes the dataset excellently suited to study the impact of offshoring on the labor market. In doing so, we make several contributions to the literature. Firstly, we make use of firm level panel data allowing us to control for unobserved firm level heterogeneity. Previous studies only relied on aggregate sector level data, thereby focusing on effects within and between sectors and hence ignoring substantial variation at the firm level. Secondly, we will investigate both direct and indirect effects of goods and services offshoring. Thirdly, we can combine our firm level data with firm/product data on production, allowing us to distinguish more clearly between import competition as opposed to offshoring. Fourthly, the literature investigating the effects of service offshoring on firm-level employment and performance outcomes is still very limited. The results are therefore likely to contribute to our understanding of this recent phenomenon.

2 Empirical Framework

3 Data

This section describes the different databases used to carry out the empirical analysis. We combine three databases, namely (1) a database containing the annual reports of firms, (2) a firm-country-service database reporting international trade in services and (3) a firm-country-product database holding information about the international trade of goods.

3.1 Data Sources

3.1.1 Annual Reports Database

We use data from the annual accounts of Belgian firms for the period 1996-2010. In principle, all limited-liability firms in Belgium are required to file their annual accounts to the National Bank of Belgium (NBB). Next to the standard variables included such as turnover, material costs, labor costs, ...,

the annual report includes the "social balance sheet" which contains rich information on the workforce such including their education level. There exist two types of accounts: complete and abbreviated. In general, firms that are affiliated to other firms, publicly listed firms and firms that exceed at least two of the three cutoff criteria in terms of employment (50 employees), balance sheet total (€3.65mio) and turnover (€7.3mio) need to file complete accounts. Only the complete accounts provide information on the education level of the workforce.[1]

3.1.2 International Trade in Services

The second database reports detailed information on trade in services. Trade in services is usually classified in four different modes (**?**). *Mode 1* is cross border supply and applies when service suppliers resident in one country provide services in another country without either buyer or supplier moving to the physical location of the other. A typical example is a call center located in India which provides services to a US firm. *Mode 2* is consumption abroad and applies when the service is consumed by a resident of one country in the territory of another country, e.g. hotel services to tourists. *Mode 3* is commercial presence and refers to firms moving to the location of the consumers to provide their services locally through the establishment of a foreign affiliate or branch. *Mode 4* is the movement of natural persons and refers to services provided by the firm of one country through the presence of natural persons in another country. For example, a Polish transport company that offers transport services in Belgium through the presence of their trucker in Belgium. The international trade in services data for Belgium are collected on the basis of the balance of payments returns sent to the National Bank of Belgium. Between 1995 and 2005, banks had to report payments made or received by their clients when the payer or the payee was

[1] There have been substantial changes in the social balance sheet starting in 2008. Most importantly, employment by skill had to be reported only in flows – i.e. the educational level of the workers entering and leaving the firm – prior to 2008, while it has to be reported in stocks starting in 2008. To construct a measure for the stock of the workforce per educational level, we will work backwards from the reported stock in 2008 and the reported inflows and outflows of the workers.

a non-resident. Moreover, in order to be included in the database, the foreign party needs to be a business and as such, the database only contains modes 1, 2 and 4 of the trade in services classification.[2] Data are available at the firm-service-country-year level and services are classified according to the EBOPS classification. Table **??** lists the types of services and the corresponding NACE code. The table groups the services into different categories, namely Transport Services, Financial Services, Construction Services, ICT Services Business Services and Cultural and Recreational Services.[3] Table **??** displays services imports and exports for the years 1995 and 2005. The total value of service imports surged from 8.5 billion euros in 1995 to 20 billion euros in 2005, an increase of over 130%. Service exports increase even more, namely by 145%, from 10 billion euros to 24 billion euros. Transport services are the largest category, followed by Business Services and Financial Services. The rankings of the different service types are similar for imports and exports, consistent with models of intra-industry trade and services being characterized by a substantial amount of product differentiation. The rise in Transport Services was much less pronounced compared to other categories and consequently lost relative importance over the sample period. Especially international trade in Business Services, ICT Services and Communication Services boomed. For most of the analysis we exclude transport services from our measure for services trade.

3.1.3 International Trade in Goods

The third database contains imports and exports of goods and covers the full population of firms that report trading activities in Belgium. The data includes both intra-EU and extra-EU imports and export flows. For intra-EU

[2] This excludes for example the transactions of French tourists in Belgium. Moreover, since we focus only on transactions of Belgian firms, it also excludes the transactions of Belgian tourists abroad.

[3] We manipulate the raw data on services trade following the suggestions of the NBB. More precisely, all transactions and services related to trade in goods as well as payments of royalties and license fees are excluded. Moreover, all transactions between related companies are dropped as they could reflect shifting of profits due to tax reasons. All transactions related to travel and transactions made by governments or international institutions are excluded. Finally, certain corrections are applied to insurance services.

trade flows, firms are only required to report their trade if its value exceeds a particular cutoff.[4] In spite of the inclusion criteria for intra-EU trade, estimations performed by the NBB suggest that total trade reported in the Trade Database accounts for more than 98% of total actual exports. For extra-EU trade flows, data are collected from customs data. All transactions for which the value is higher than €1,000 or whose weight is over 1,000Kg have to be recorded.[5] The data is recorded at the firm-product-country-year level, separately for each flow. This implies that each observation represents an export or import flow of a particular 8-digit Combined Nomenclature (CN8) product to or from a particular country. We translate the CN8 codes into NACE 4 digit codes using a concordance table using the procedure explained in **?**. The database runs from 1993 to 2010.[6] The last row in Table **??** displays total imports and exports of goods in 1995 and 2005. While the increase in Service Trade was more pronounced over the period, the value of total trade in services was only 10% of the value of total trade in goods in 2005. The evolution of services trade is compared with the evolution of goods trade in Figure **??** showing that both services imports and exports increased by more goods imports and exports of goods. The difference is even more pronounced if we exclude Transportation Services. Table **??** makes a comparison between the top destination countries/countries of origin for exports and imports of goods versus services. Trade in goods is dominated by trade with the three neighbouring countries (The Netherlands, Germany and France), accounting for over 40% of total trade in goods. For trade in services, the United Kingdom tops the ranking of the countries of destination/origin. The USA is as well a relatively more important services trading partner, even ranking second after the UK for the export of services. This is consistent with **?** who report service trade between the UK and USA to be more important

[4] These cutoffs changed over time. From 1995 to 1997, firms had to report all their trade flows if they were exporting or importing for more than €104,115 per year. For 1998 to 2005, this threshold increased to €250,000 per year. From 2006 onwards, these thresholds were raised to €1,000,000 for exports and to €400,000 for imports.

[5] Note however that over the sample period, a number of countries joined the EU.

[6] We exclude all trade transactions that do not involve a "transfer of ownership with compensation" from the data. This implies we omit flows such as processing or repair transactions.

compared to goods trade.

3.1.4 Merging the Databases

The three databases are merged together using the unique firm level VAT number. To convert the data into real values we use deflators from the EU KLEMS database. The international trade data – both services and goods – are deflated with the output deflator corresponding to the NACE code of the trade flow. Turnover from the annual accounts database is deflated with the output deflator and material input and value added are deflated with a material and value added deflator respectively. To convert tangible fixed assets into real values, we apply the capital deflator reported by Eurostat. Finally we use the Harmonized Consumer Price Index (HCPI) to deflate wages. The final dataset consists of unbalanced panel of 20,489 firms active in the private sector in Belgium for the period 1996 to 2005. We only keep firms that have to report the full annual report as we focus on the education level of the workforce. Table **??** displays total imports and exports of the different types of services for this restricted sample. The restricted dataset represents around 55% of total employment and covers around 65-70% of total service and goods trade.[7] The relative importance of each service category – with the exception of Financial Services – is comparable to the full dataset. Even though mainly large firms are included in the sample, only a minority of firms export services, namely 23.7% in 2005. A larger share of firms imports services, but – not surprisingly – the value of services imported per importing firm is lower. Although Transport Services are by far the largest category in terms of imports and exports value, the number of firms active in trading this category is relatively more limited. Especially the share of firms importing Business and Financial services is large compared to the total value of imports of these categories. In Figure **??** we plot the average offshoring intensity for each NACE 2 digit sector for goods and services respectively. The offshoring ratios are computed as $Ratio = \frac{Offshoring}{TotalInputs}$ where total inputs is the total amount of reported material and service inputs. For sectors such as the

[7] The coverage of the international trade in services is much smaller as banks are not included in the annual report database.

Chemical, Rubber and Plastic, Manufacture of Transport Goods, Manufacture of Telecommunication Equipment and Paper Products over 30% of total inputs are offshored, mostly due to the offshoring of intermediate goods. Not surprisingly, offshoring of intermediate inputs is most prevalent in the manufacturing industries. Offshoring of service inputs is more common in service sectors, but total offshoring is higher in manufacturing industries, reflecting higher tradability of goods in comparison with services.

4 Results

5 Conclusions

TO BE COMPLETED

References

Amiti, Mary and Jozef Konings, "Trade Liberalization, Intermediate Inputs, and Productivity: Evidence from Indonesia," 2007, *97* (5), 1611–1638. The American Economic Review. 2

___ **and Shang-Jin Wei**, "Fear of service outsourcing: Is it justified?," *Economic Policy*, 2005, *20* (42), 308–347. Fear of service outsourcing: Is it justified? 2

Blinder, Alan S., "Offshoring: The Next Industrial Revolution?," in "Foreign Affairs," Vol. 85, Foreign Affairs, 2006, pp. 113–128. 2

Breinlich, Holger and Chiara Criscuolo, "International trade in services: A portrait of importers and exporters," *Journal of International Economics*, 2011, *84*. 7

Crino, Rosario, "Service Offshoring and the Skill Composition of Labour Demand," *Oxford Bulletin of Economics and Statistics*, 2012, *74* (1), 20–57. 2

Feenstra, Robert C. and Gordon H. Hanson, "Global Production Sharing and Rising Inequality: a Survey of Trade and Wages," in K Choi and James Harrigan, eds., *Handbook of International Economics*, Oxford: Blackwell Publishing, 2003. 2

Francois, Joseph and Bernard Hoekman, "Services Trade and Policy," *Journal of Economic Literature*, 2010, *48* (3), 642–92. 4

Goldberg, Pinelopi Koujianou, Amit Kumar Khandelwal, Nina Pavcnik, and Petia Topalova, "Imported Intermediate Inputs and Domestic Product Growth: Evidence from India," *The Quarterly Journal of Economics*, 2010, *125* (4), 1727–1767. 2

Halpern, L., M. Koren, and A. Szeidl, "Imported inputs and productivity," *Unpublished manuscript*, 2011. 2

Krugman, Paul, "Trade and Wages, Reconsidered," *Brookings Papers on Economic Activity*, 2008, *39*, 103–154. 2

The Economist, "The Digitisation for manufacturing will transform the way goods are made and change the politics of jobs too," *The Economist print edition*, 2012, *April 21st.* 2

Van Beveren, Ilke, Andrew B. Bernard, and Hylke Vandenbussche, "Concording EU trade and production data over time," *Tuck School of Business, mimeo*, 2012. 6

6 Tables

Table 1: International trade in services: Classification of services

Table 2: International Trade in Goods and Services, 1995-2005

	Imports					Exports				
	1995		2005		Change	1995		2005		Change
	Value	Share	Value	Share	95-05	Value	Share	Value	Share	95-05
Transport Services	4,628	53.4%	8,802	44.1%	+90.2%	5,639	56.5%	9,922	40.7%	+75.9%
Business Services	1,604	18.5%	5,692	28.5%	+254.8%	1,645	16.5%	6,214	25.5%	+277.8%
Financial Services	1,112	12.8%	1,929	9.7%	+73.4%	1,122	11.2%	2,800	11.5%	+149.5%
Construction Services	442	5.1%	636	3.2%	+43.8%	410	4.1%	1,439	5.9%	+251.3%
ICT Services	398	4.6%	1,476	7.4%	+271.2%	656	6.6%	1,975	8.1%	+201.0%
Communication Services	238	2.7%	1,048	5.3%	+340.8%	418	4.2%	1,644	6.7%	+293.3%
Cultural Services	237	2.7%	370	1.9%	+55.7%	86	0.9%	411	1.7%	+376.2%
Total Trade in Serices	8,659	100.0%	19,952	100%	+130.4%	9,977	100.0%	24,406	100.0%	+144.6%
Trade in Goods	99,740		214,540		+115.0%	110,352		224,976		+103.9%

Values in Million Euros. Full sample from international trade in services and international trade in goods databases.

Table 3: Countries of Origin/Destination and Trade in Services/Goods

Services					
Imports			Exports		
Top Countries	Value	Share	Top Countries	Value	Share
United Kingdom	3,226	16.2%	United Kingdom	4,260	17.5%
France	2,502	12.5%	USA	4,147	17.0%
The Netherlands	2,479	12.4%	The Netherlands	3,600	14.7%
USA	2,311	11.6%	France	2,888	11.8%
Germany	2,212	11.1%	Germany	2,706	11.1%
Italy	870	4.4%	Luxembourg	1,136	4.7%
Switzerland	726	3.6%	Switzerland	730	3.0%
Spain	574	2.9%	Sweden	487	2.0%
Luxembourg	522	2.6%	Italy	455	1.9%
Hong Kong	403	2.0%	Spain	351	1.4%
Goods					
Imports			Exports		
Top Countries	Value	Share	Top Countries	Value	Share
The Netherlands	51,272	20.5%	Germany	42,383	16.1%
Germany	35,918	14.3%	France	40,669	15.5%
France	27,457	11.0%	The Netherlands	32,798	12.5%
USA	14,362	5.7%	United Kingdom	19,186	7.3%
United Kingdom	14,356	5.7%	USA	15,599	5.9%
Ireland	14,254	5.7%	Italy	12,107	4.6%
China	8,035	3.2%	Spain	8,313	3.2%
Italy	6,987	2.8%	India	6,661	2.5%
Japan	5,942	2.4%	Luxembourg	4,973	1.8%
Russia	5,935	2.4%	Poland	4,479	1.7%

Values in Million Euros. Services data are from 2005. Goods data are from 2010

Table 4: Summary Statistics

variable	**mean**	**p50**	**sd**
Turnover (×1000€)	32423	7760	210787
Exports of Goods (×1000€)	13184	690	89766
Imports of Goods (×1000€)	11951	1707	90572
Exports of Services (×1000€)	2674	29	24391
Imports of Services (×1000€)	2309	79	20455

Table 5: Imports and Exports of Different Service Types (values in million euros)

Type of Service	Imports						Exports					
		1996			2005			1996			2005	
	Value	Share	% Firms	Value	Share	%Firms	Value	Share	%Firms	Value	Share	%Firms
Transport Services	3,172	60.7%	10.8%	6,341	45.9%	11.4%	4,087	61.4%	7.5%	7,440	47.7%	7.2%
Business Services	951	18.1%	11.3%	4,610	33.4%	17.4%	919	13.8%	7.4%	3,765	24.1%	10.5%
Construction Services	353	6.8%	2.8%	509	3.7%	3.4%	379	5.7%	2.2%	1,176	7.5%	2.9%
ICT Services	315	6.0%	4.8%	1084	7.9%	6.0%	588	8.8%	2.7%	1,405	9.0%	2.6%
Communication Services	245	4.7%	1.7%	957	6.9%	2.3%	514	7.7%	0.7%	1,489	9.5%	1.2%
Financial Services	172	3.3%	9.0%	276	2.0%	10.0%	161	2.4 %	3.8%	282	1.8%	3.4%
Cultural Services	18	0.3%	0.6%	30	0.2%	1.0%	6	0.1%	0.2%	37	0.2%	0.3%
Total	5,226	100.0%	23.7%	13,806	100.0%	32.4%	6,654	100%	18.7%	15,594	100.0%	23.7%
Total Trade in Goods	65,365	60.1%		122,559		52.5%	71,467		56.6%	127,093		45.8%

Table 6: Results Manufacturing Sector; Employment Levels

	(1) Empl.	(2) Empl.	(3) Empl.	(4) Empl.	(5) Total Skills	(6) Low Skilled	(7) High Skilled
Goods Offsh.	0.00825**	0.00824**	0.00629**	0.00438*	0.00463**	0.00140	0.00284
	[0.00217]	[0.00216]	[0.00196]	[0.00192]	[0.00178]	[0.00137]	[0.00188]
Service Offsh.	0.00228**	0.00255**	0.00148*	0.00124*	0.00174**	0.00136*	0.00204*
	[0.000799]	[0.000797]	[0.000719]	[0.000608]	[0.000641]	[0.000695]	[0.000820]
Dom. Goods Outs.	-0.00356*	-0.00352*	-0.00282+	-0.00465**	-0.00233+	-0.00345**	-0.00246+
	[0.00156]	[0.00157]	[0.00148]	[0.00134]	[0.00140]	[0.00130]	[0.00132]
Dom. Serv. Outs.		0.0164**	0.0119**	0.00920**	0.0124**	0.00833**	0.00368
		[0.00489]	[0.00417]	[0.00328]	[0.00424]	[0.00287]	[0.00490]
Imports Goods	-0.00109	-0.000406	-0.00317	-0.00282	0.00637	-0.000485	0.0264*
	[0.0116]	[0.0115]	[0.0110]	[0.00863]	[0.0109]	[0.0118]	[0.0117]
Turnover	0.465**	0.456**	0.393**	0.281**	0.396**	0.296**	0.232**
	[0.0273]	[0.0274]	[0.0260]	[0.0290]	[0.0246]	[0.0226]	[0.0200]
Capital			0.155**				
			[0.0107]				
Lag Empl.				0.523**			
				[0.0277]			
Obs	22085	22085	21963	18948	21169	19831	19546
Nr. Firms	3018	3018	3011	2959	3014	2963	2946
R^2	0.305	0.307	0.377	0.482	0.267	0.152	0.103

Standard errors in brackets

+ $p < .10$, * $p < .05$, ** $p < .01$

Table 7: Results Services Sector; Employment Levels

	(1) Empl.	(2) Empl.	(3) Empl.	(4) Empl.	(5) Total Skills	(6) Low Skilled	(7) High Skilled
Goods Offsh.	0.00678**	0.00678**	0.00520**	0.00337**	0.00637**	0.00455**	0.00124
	[0.000994]	[0.000994]	[0.000931]	[0.000782]	[0.000940]	[0.000870]	[0.000993]
Service Offsh.	0.00327**	0.00327**	0.00203**	0.00117*	0.00280**	0.00146*	0.00205**
	[0.000656]	[0.000656]	[0.000607]	[0.000509]	[0.000599]	[0.000692]	[0.000712]
Dom. Goods Outs.	-0.00459**	-0.00459**	-0.00347**	-0.00317**	-0.00377**	-0.00142	-0.00358**
	[0.00110]	[0.00110]	[0.000910]	[0.000778]	[0.00108]	[0.00106]	[0.00127]
Dom. Serv. Outs.	0.0103**	0.0103**	0.00744**	0.00632**	0.00841**	0.00829**	0.00564**
	[0.00154]	[0.00154]	[0.00135]	[0.00119]	[0.00153]	[0.00165]	[0.00160]
Turnover	0.383**	0.383**	0.317**	0.216**	0.343**	0.243**	0.209**
	[0.0160]	[0.0160]	[0.0137]	[0.0139]	[0.0164]	[0.0157]	[0.0166]
Obs	39892	39892	39351	34096	37454	33007	33431
Nr. Firms	5874	5874	5841	5797	5861	5757	5784
R^2	0.257	0.257	0.330	0.439	0.256	0.135	0.127

Standard errors in brackets

+ $p < .10$, * $p < .05$, ** $p < .01$

7 Figures

Figure 1: Evolution Trade in Goods and Services

Figure 2: Offshoring per Sector